299-E33-71 (A6879)

Log Data Report

Borehole Information:

Borehole:	299-E33-71 (A6879)		Site:	216-B-8 Crib	
Coordinates		GWL (ft)[1]:	see Borehole Notes	GWL Date:	9/01
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
137472	573781	Dec. 1947	636.37 ft	150	

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel	2.73	8 5/8	8.0	5/16	0	146

Borehole Notes:

The borehole was swabbed before collecting data, and water was detected inside the casing at 115.4 ft. It is not known if this water is perched or is surface water that has accumulated inside of the casing.

The logging engineer measured the pipe stickup at the borehole using a steel tape. Calipers were used to measure casing outside diameter and thickness, the casing inside diameter is calculated.

Logging Equipment Information:

Logging System:	Gamma 2B		Type: SGLS (35%)
Calibration Date:	09/00	Calibration Reference:	GJO-2001-245-TAR
		Logging Procedure:	MAC-HGLP 1.6.5

Logging System:	Gamma 1D		Type: SGLS (35%)
Calibration Date:	09/00	Calibration Reference:	GJO-2001-243-TAR
		Logging Procedure:	MAC-HGLP 1.6.5

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5
Date	09/19/01	10/02/01	10/03/01	10/03/01	
Logging Engineer	Musial	Musial	Musial	Musial	
Start Depth (ft)	3.0	69.0	97.0	75.0	
Finish Depth (ft)	70.5	98.5	115.0	87.0	
Count Time (sec)	100	100	100	100	
Live/Real	R	R	R	R	
Shield (Y/N)	N/A[3]	N/A	N/A	N/A	
MSA Interval (ft)	0.5	0.5	0.5	0.5	
ft/min	N/A	N/A	N/A	N/A	
Pre-Verification	B0055CAB	A0006CAB	A0007CAB	A0007CAB	

Log Run	1	2	3	4	5
Start File	B0055000	A0006000	A0007000	A0007037	
Finish File	B0055136	A0006060	A0007036	A0007061	
Post-Verification	B0055CAA	A0006CAA	A0007CAA	A0007CAA	
Depth Return Error (ft)	0	0.2	0	0	
Comments	Gamma 2B	Gamma 1D	Gamma 1D	Gamma 1D Repeat Section	

Logging Operation Notes:

SGLS logging system Gamma 2B was used for the first logging run. Subsequent logging runs used logging system Gamma 1D because of equipment breakdown of logging system Gamma 2B.

The logging engineer was unable to shell out of the log program to capture file B0055CAB for analysis before logging run 1. High dead time was encountered from about 30 to 37.5 ft during logging run 1. During collection of file B0055CAA, wind blew over tool/verifier. During logging run 2, dead time was more than 50% from approximately 76.5 to 82 ft.

Analysis Notes:

Analyst:	Sobczyk	Date:	10/05/01	Reference:	MAC-VZCP 1.7.9 Rev. 2

Pre-run and post-run verification spectra for the SGLS were evaluated. All of the gamma 2B spectra were within the control limits. The post-survey verification (file B0055CAA) was outside of the warning limits. The counts per second for the 609-keV photopeak were above the upper warning limits for this post-run verification spectrum. The verifier and sonde blew over while this spectrum was being acquired, which may have caused the failure of this verification spectrum. The acceptance criteria for field verification of the Gamma 1D logging system are in the process of being established. Examinations of spectra indicate that the detector appears to have functioned normally during the log runs, and the log data are provisionally accepted, subject to further review and analysis.

Individual spectra were processed in batch mode using APTEC Supervisor. Concentrations were calculated in EXCEL, using parameters determined from analysis of calibration data collected in August 2000. The casing configuration was assumed to be one string of 8-in. casing with a thickness of 5/16 in. These assumptions are consistent with the logging engineer's measurements. A correction for water in the borehole was not applied. Dead time corrections were applied where necessary. Zero reference was assumed to be the top of the casing.

Dead time was greater than 40 percent in the intervals from 31.5 to 37.5 ft and 76.0 to 82.5 ft. Maximum dead time in the zone from 31.5 to 37.5 ft reaches 100 percent, and data collected in this zone are unreliable. In the interval from 76.0 to 82.5 ft, dead time does not exceed 60 percent, and the reliability of the data is reduced. Dead time corrections were required where the tool was not saturated. At dead time greater than 40 percent, peak spreading and pulse pile-up effects may result in underestimation of activities. This effect is not entirely corrected by the dead time correction, and the extent of error increases with increasing dead time.

The repeat log (75 to 87 ft) was run over an interval of high dead time. Despite being run in a zone of high activity, the rerun of the natural radionuclides, ^{40}K and ^{232}Th, showed good repeatability. Discernable 609-keV photopeaks for ^{238}U were obscured by the high ^{137}Cs activity. The comparison of the repeat log with the original log run for ^{137}Cs shows a difference of about 50 pCi/g with the Gamma 1D sonde reading lower during the rerun. This difference is attributed to the high activity and corresponding dead time that was encountered. Because the repeat section did not overlap that portion of the hole logged with the Gamma 2B sonde, a direct comparison of the Gamma 1D and Gamma 2B sondes cannot be made in this borehole.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and ^{137}Cs. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation.

Results and Interpretations:

^{137}Cs, which is a man-made radionuclide, was detected almost continually throughout the logged portion of this borehole. A zone of ^{137}Cs contamination was detected near the ground surface (log depth 3.0 through 11.0 ft) with activities ranging from 0.2 to 178.5 pCi/g. ^{137}Cs occurred between 29.5 and 115.0 ft. In this interval, activities exceeded 1,000 pCi/g in the intervals between 31.5 and 38.0 ft, 79.0 and 91.0 ft, and 95.5 and 96.5 ft. Above the zones of intense gamma-ray activity, apparent ^{40}K activities are about 12 to 15 pCi/g. Within the zones of intense gamma-ray activity, apparent ^{40}K activities are about 16 to 20 pCi/g. The relatively high concentrations of Cs-137 below about 30 ft may correspond with the increase in ^{40}K activities and the transition from the coarse-grained sediments of the Hanford H1 to the finer grained sediments of the Hanford H2.

Because of the high activities encountered by the SGLS, the intervals from 30.5 to 39.0 ft and 75.0 to 98.0 ft should be logged with the High Rate Logging System.

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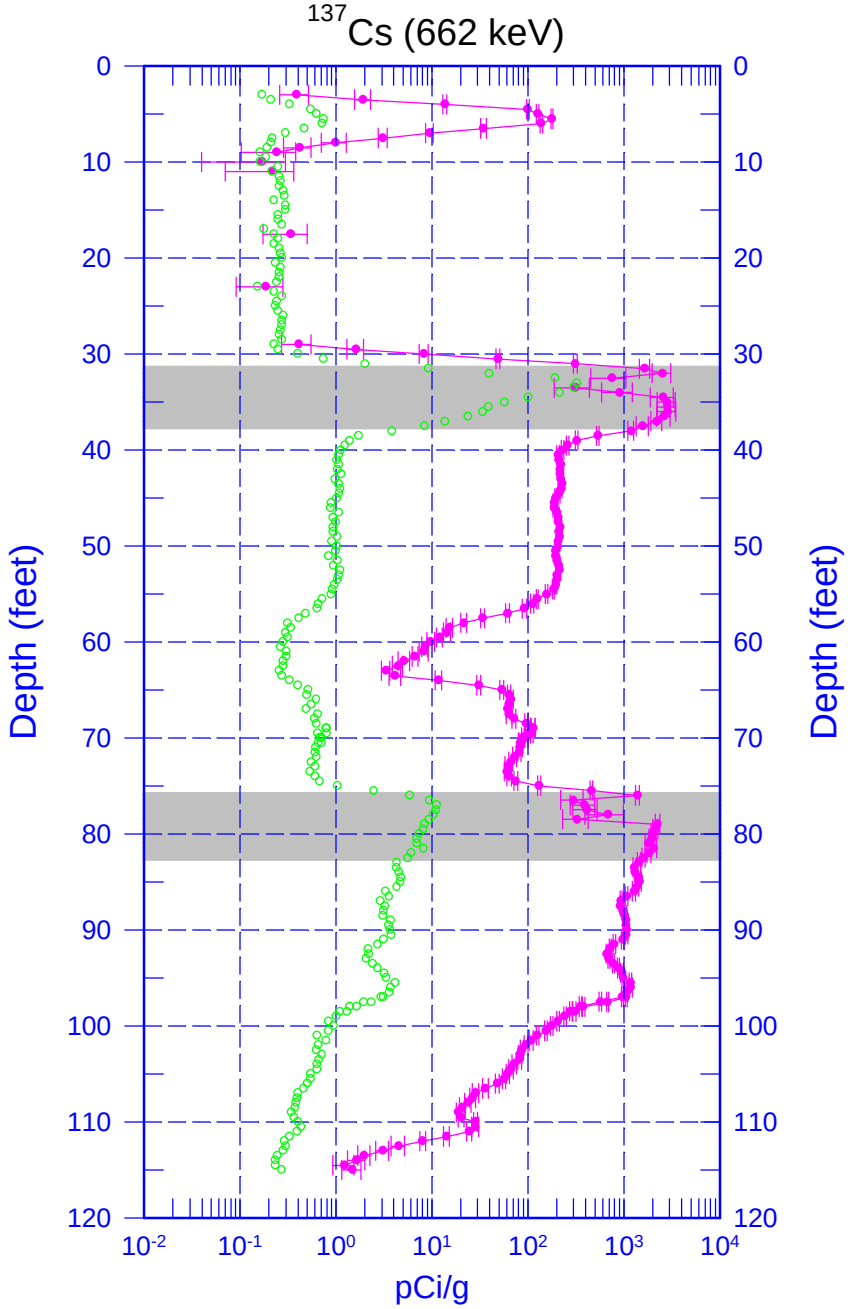
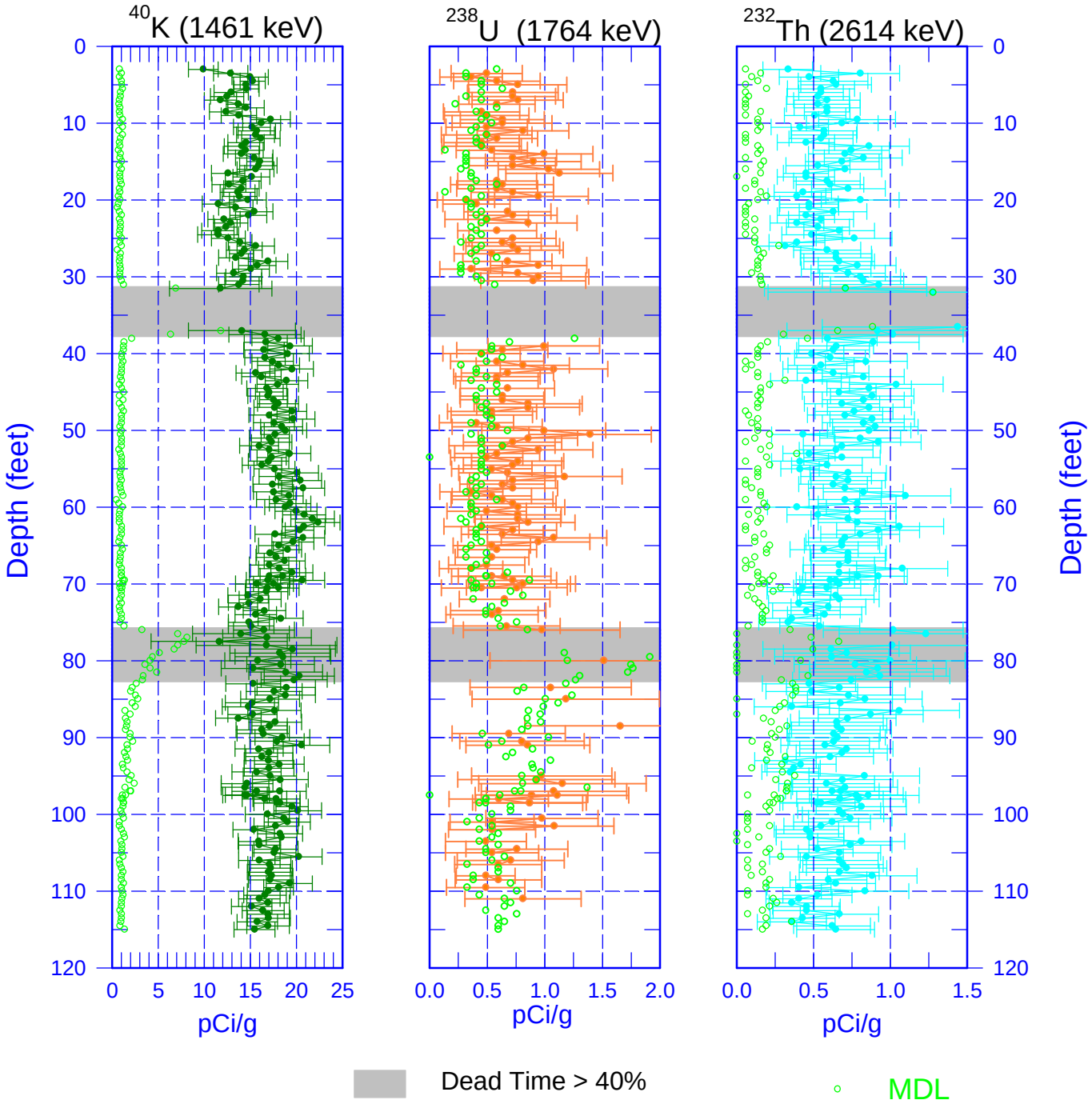
[1] GWL – groundwater level
[2] TOC – top of casing
[3] n/a – not applicable

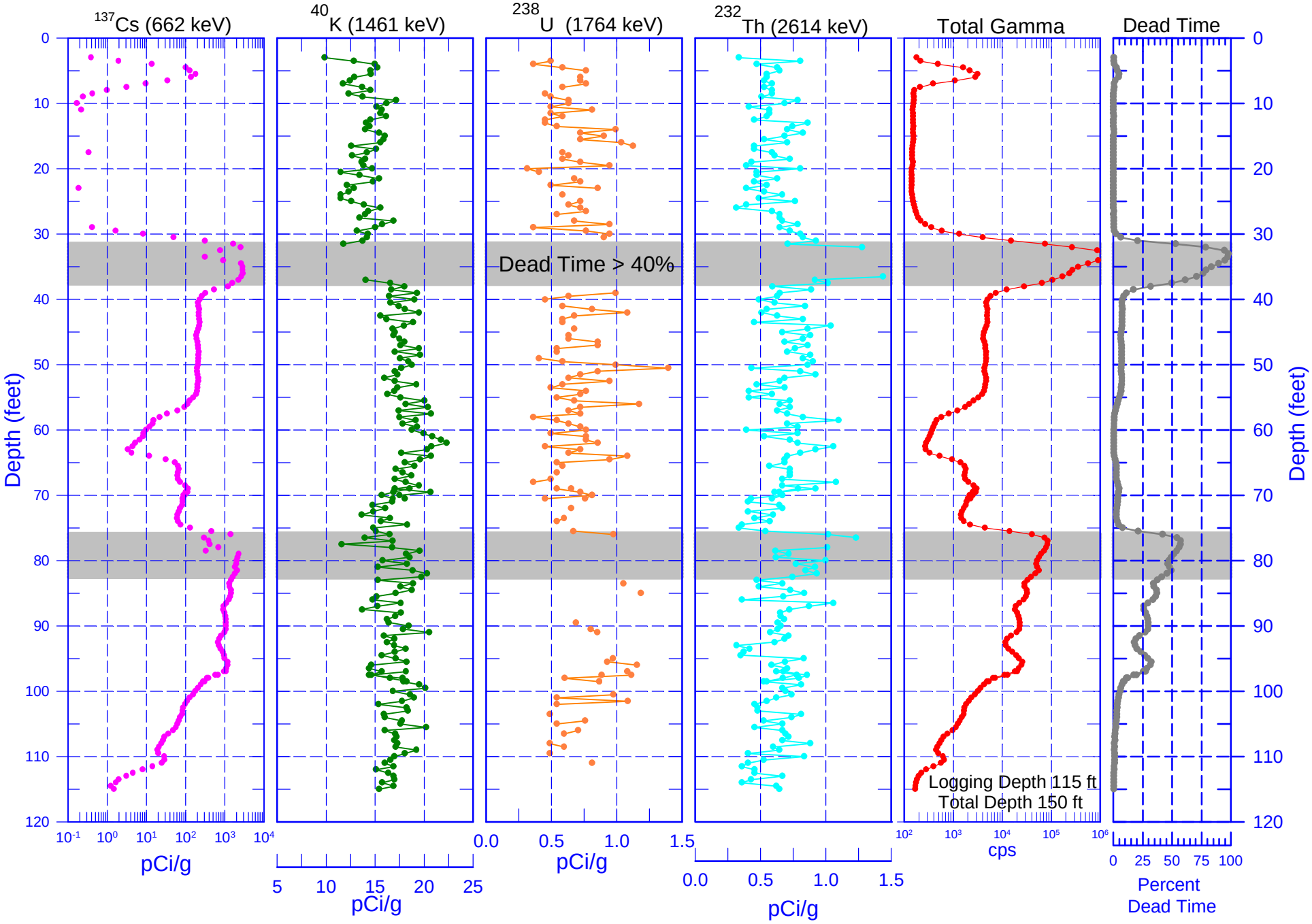
299-E33-71 (A6879)
Man-Made Radionuclide



299-E33-71 (A6879)
Natural Gamma Logs



299-E33-71 (A6879) Combination Plot



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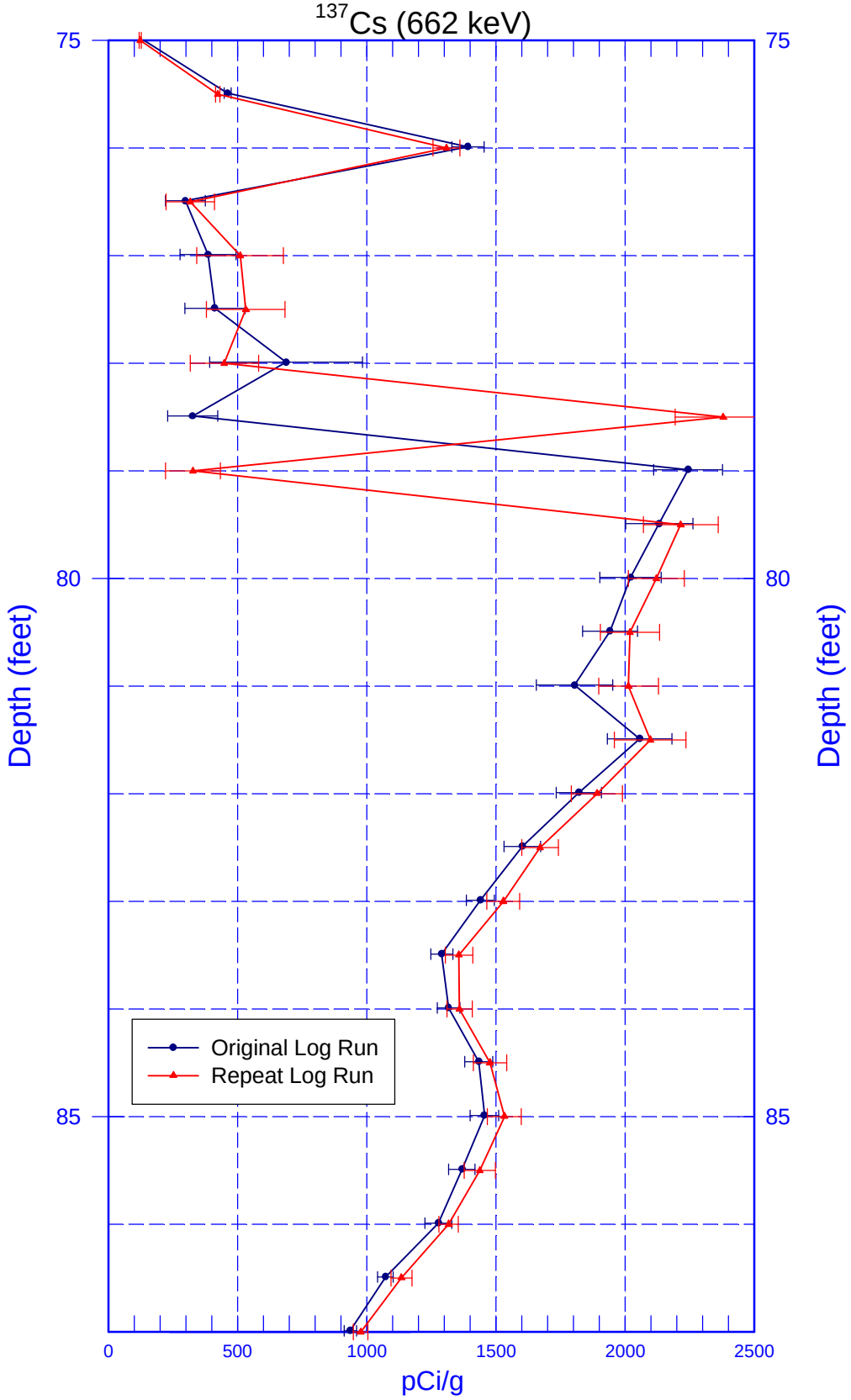
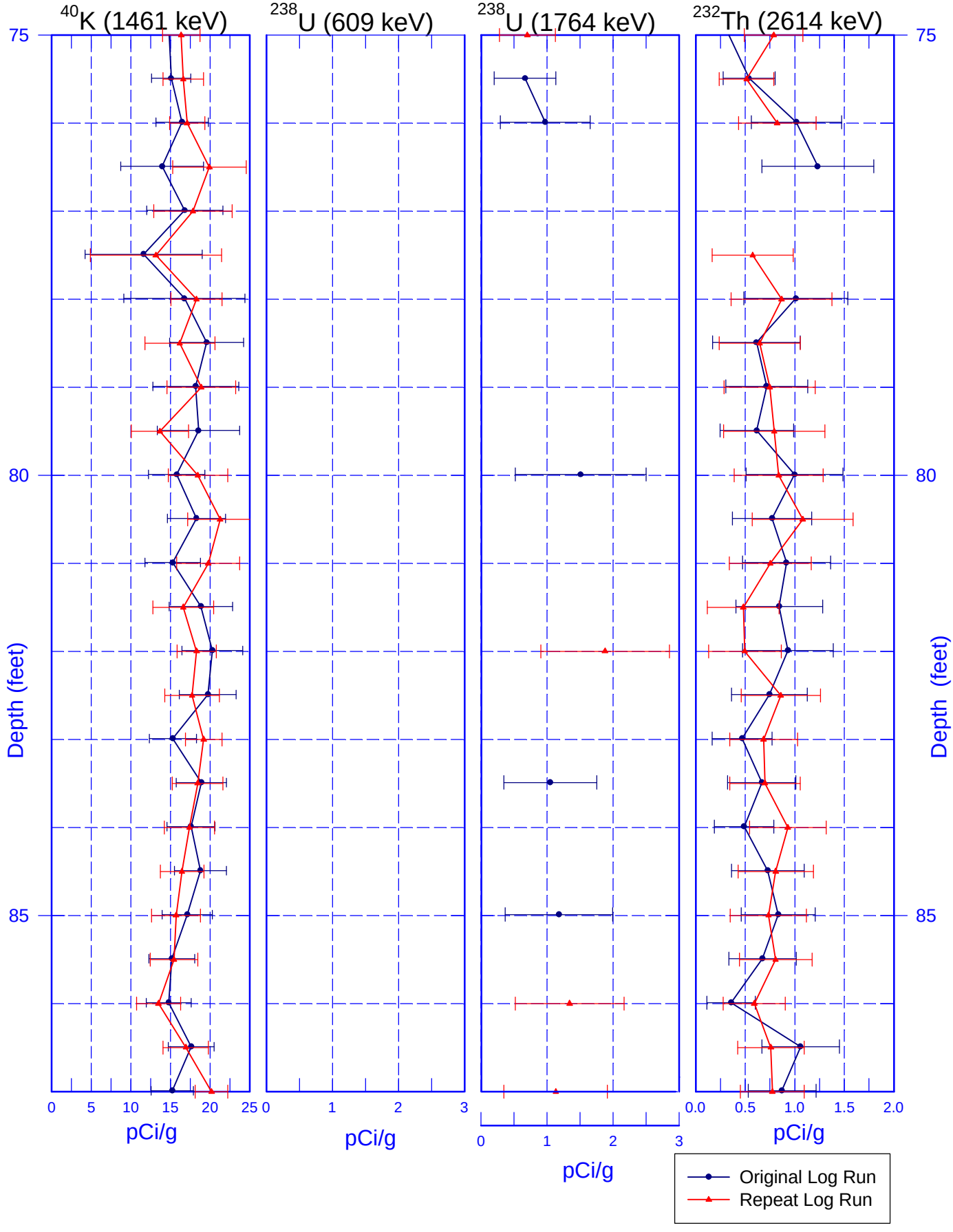
Rerun of Man-Made Radionuclide



299-E33-71 (A6879)

Rerun of Natural Gamma Logs



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